

Low-Cost E Series Multifunction DAQ

16-Bit, 200 kS/s, 16 Analog Inputs

NI 6034E, NI 6036E

- 16 analog inputs at 200 kS/s, 16-bit resolution
- 2 analog outputs, 16-bit resolution (NI 6036)
- 8 digital I/O lines (5 V TTL/CMOS); two 24-bit counter/timers
- Digital triggering
- 4 analog input signal ranges
- NI-DAQ driver simplifies configuration and measurements

Models

- NI PCI-6034E
- NI PCI-6036E
- NI DAQCard-6036E for PCMCIA **NEW!**

Operating Systems

- Windows 2000/NT/XP/Me/9x
- Mac OS 9*
- Others such as Linux (page 187)

Recommended Software

- LabVIEW
- LabWindows/CVI
- Measurement Studio for Visual Basic
- VI Logger

Other Compatible Software

- Visual Basic
- C/C++

Driver Software (included)

- NI-DAQ

Calibration Certificate Included

See page 21

*See ordering information

NEW



Overview and Applications

NI 6034E and NI 6036E devices use E Series technology to deliver high performance, reliable data acquisition capabilities. These devices are used in a broad variety of applications including:

- Continuous high-speed data logging at up to 200 kS/s
- Externally timed and/or triggered data acquisition
- High-voltage and sensor measurements when used with NI signal conditioning (see page 244)
- High-channel-count system scalability with RTSI bus

Features

NI 6034E and NI 6036E devices feature the NI-PGIA, an instrumentation-class amplifier that guarantees settling times at all gains. Typical commercial off-the-shelf amplifier components don't meet the settling time requirements for high-gain measurement applications. Without the NI-PGIA, 16-bit devices with a 100X gain can have an effective resolution of 12 bits. The NI 6034E and NI 6036E devices also offer resolution improvement technologies such as dithering to reduce quantization error. This technology permits NI 16-bit multifunction DAQ devices to perform with an effective input resolution of at least 18-bits. For a full description of NI accuracy advantages, see page 188. These devices offer several methods in which to connect your signals

including differential for eight analog input channels and maximum noise elimination, as well as referenced and nonreferenced single-ended for 16 analog input channels.

NI 6034E and NI 6036E devices feature digital triggering, two 24-bit 20 MHz counter/timers, and eight digital I/O lines compatible with both 5 V TTL and CMOS. NI 6036E devices also feature two 16-bit analog outputs.

INFO CODES

For more information, or to order products online visit ni.com/info and enter:

pci6034e
pci6036e
daqcard6036e

BUY ONLINE!

For a detailed list of differences between Performance E Series and Low-Cost E Series, see Table 1 on page 191.

Family	Bus	Analog Inputs	Resolution	Sampling Rate S/s	Input Range	Analog Outputs	Resolution	Output Rate	Output Range	Digital I/O	Counter/Timers	Triggers
NI 6034E	PCI	16 SE/8 DI	16 bits	200 kS/s	±0.05 to ±10 V	—	—	—	—	8	2, 24-bit	Digital
NI 6036E	PCI, PCMCIA	16 SE/8 DI	16 bits	200 kS/s	±0.05 to ±10 V	2	16 bits	10 kS/s ¹	±10 V	8	2, 24-bit	Digital

¹10 kS/s maximum when using the single DMA channel for analog output. 1 kS/s maximum when using the single DMA channel for either analog input or counter/timer operations.

1 kS/s maximum for DAQCard-6036E in all cases.

Table 1. NI 6036E and NI 6034E Channel, Speed, and Resolution Specifications (see page 238 for detailed specifications)

Low-Cost E Series Multifunction DAQ

16-Bit, 200 kS/s, 16 Analog Inputs

Nominal Range (V)		Absolute Accuracy							Relative Accuracy	
		% of Reading		Offset (µV)	Noise + Quantization (µV)		Temp Drift (%/°C)	Absolute Accuracy at Full Scale (mV)		
Positive FS	Negative FS	24 Hrs	1 Year		Single Pt.	Averaged		Single Pt.	Averaged	
10.0	-10.0	0.0646	0.0688	1591.4	885.0	77.90	0.0010	8.553	1025.20	102.50
5.0	-5.0	0.0146	0.0188	806.2	442.5	38.90	0.0005	1.787	512.60	51.26
0.5	-0.5	0.0646	0.0688	99.5	53.4	4.76	0.0010	0.448	62.73	6.27
0.05	-0.05	0.0646	0.0688	28.9	26.4	2.57	0.0010	0.066	33.80	3.38

Note: Accuracies are valid for measurements following an internal E Series Calibration. Averaged numbers assume dithering and averaging of 100 single-channel readings. Measurement accuracies are listed for operational temperatures within ± 1 °C of internal calibration temperature and ± 10 °C of external or factory-calibration temperature. One-year calibration interval recommended. The Absolute Accuracy at Full Scale calculations were performed for a maximum range input voltage (for example, 10 V for the ± 10 V range) after one year, assuming 100 pt averaging of data. See overview on page 194 for an example calculations.

Table 2. NI PCI-6034E and NI PCI-6036E Analog Input Accuracy Specifications

Nominal Range (V)		Absolute Accuracy							Relative Accuracy	
		% of Reading		Offset (mV)	Noise + Quantization (mV)		Temp Drift (%/°C)	Absolute Accuracy at Full Scale (mV)		
Positive FS	Negative FS	24 Hrs	1 Year		Single Pt.	Averaged		Single Pt.	Averaged	
10	-10	0.0872	0.0914	2.93	0.89	0.078	0.0010	12.154	1.03	0.10
5	-5	0.0272	0.0314	1.48	0.44	0.039	0.0005	3.087	0.51	0.051
0.5	-0.5	0.0872	0.0914	0.167	0.053	0.005	0.0010	0.629	0.063	0.006
0.05	-0.05	0.0872	0.0914	0.036	0.026	0.003	0.0010	0.084	0.034	0.003

Note: Accuracies are valid for measurements following an internal E Series Calibration. Averaged numbers assume dithering and averaging of 100 single-channel readings. Measurement accuracies are listed for operational temperatures within ± 1 °C of internal calibration temperature and ± 10 °C of external or factory-calibration temperature. One-year calibration interval recommended. The Absolute Accuracy at Full Scale calculations were performed for a maximum range input voltage (for example, 10 V for the ± 10 V range) after one year, assuming 100 pt averaging of data. See page 194 for example calculations.

Table 3. NI DAQCard-6036E Analog Input Accuracy Specifications

Family	Nominal Range (V) FS	Absolute Accuracy					Absolute Accuracy at Full Scale (mV)	
		% of Reading			Offset (mV)	Temp Drift (%/°C)		
		24 Hrs	90 Days	1 Year				
PCI-6036E	± 10	0.009	0.011	0.013	1.1	0.0005	2.417	
DAQCard-6036E	± 10	0.009	0.011	0.013	1.22	0.0005	2.547	

Note: Temp Drift applies only if ambient is greater than ± 10 °C of previous external calibration. See page 194 for example calculations.

Table 4. NI PCI-6036E and NI DAQCard-6036E Analog Output Accuracy Specifications

Low-Cost E Series Multifunction DAQ

16-Bit, 200 kS/s, 16 Analog Inputs

Driver Software

NI-DAQ is the robust driver software included with all National Instruments data acquisition and signal conditioning products. This easy-to-use software tightly integrates the full functionality of your DAQ hardware to LabVIEW, LabWindows/CVI, and Measurement Studio for Visual Basic. High-performance features include multidevice synchronization, networked measurements, and DMA data management. Bundled with NI-DAQ, the Measurement & Automation Explorer utility simplifies the configuration of your measurement hardware with device test panels, interactive measurements, and scaled I/O channels. NI-DAQ also provides numerous example programs for LabVIEW and other application development environments to get you started with your application quickly.

Services and Support/Training

As a complement to your data acquisition and signal conditioning product, consider:

- **Technical Support** – Included in hardware/software purchase through applications engineers worldwide, Web resources with more than 1000 example programs and more than 7000 KnowledgeBases, and Premier Support – ni.com/support
- **NI Factory Installation Services (FIS)** – Software and hardware installed in PXI and PXI/SCXI systems, tested and ready to use – ni.com/advisor
- **Calibration** – Includes NIST-traceable basic calibration certificate, services for ANSI/NCSL-Z540 and periodic calibration – ni.com/calibration
- **Extended Warranty** – Meet project life-cycle requirements and maintain optimal performance in a cost-effective way – ni.com/services
- **Data Acquisition Training** – Instructor-led courses – ni.com/training
- **Professional Services** – Feasibility, consulting, and integration through our Alliance Program members – ni.com/alliance

For more information on NI services and support, visit ni.com/services

Tech Tip

Learn how to reduce your development time and system costs. Visit ni.com/info and enter **mready** to download an interactive white paper on the benefits of Measurement Ready DAQ – measurement quality, software integration, and solutions support.

For more information, visit ni.com/info and enter: mready.

Ordering Information

NI PCI-6034E	778075-01
NI PCI-6036E ¹	778465-01
NI DAQCard-6036E ¹	778561-01

Includes NI-DAQ driver software.
¹Windows only.

For information on extended warranty and value-added services, see page 20.

Recommended Configurations

Family	DAQ Devices	Accessory	Cable
NI 6034E	PCI-6034E	CB-68LP (777145-01)	R6868 (182482-01)
NI 6036E	PCI-6036E	CB-68LP (777145-01)	R6868 (182482-01)
NI 6036E	DAQCard-6036E	CB-68LP (777145-01)	RC6868 (187252-01)

For E Series accessory and cable information, see page 221.

Related Products

For related products, please refer to:

- SCXI Signal Conditioning – page 246
- SCC Signal Conditioning – page 320
- Analog Output Multifunction DAQ – page 365
- High-Speed Digital I/O – page 378

See page 221 for connector diagrams.

See page 238 for detailed specifications.

Multifunction DAQ Overview

Multifunction DAQ Overview

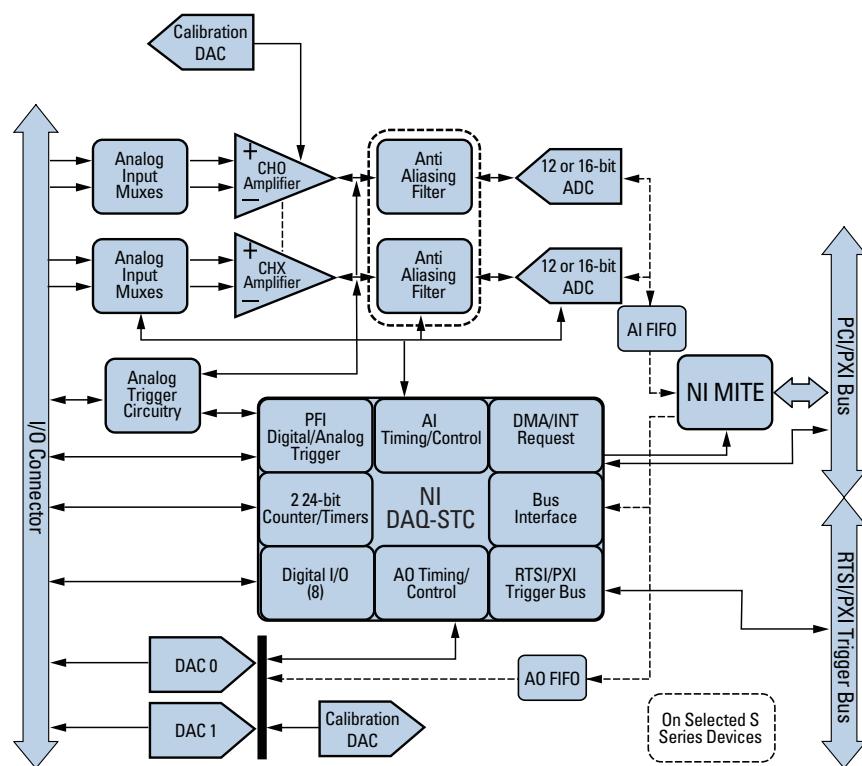


Diagram 1. S Series Diagram

DAQ and Signal Conditioning

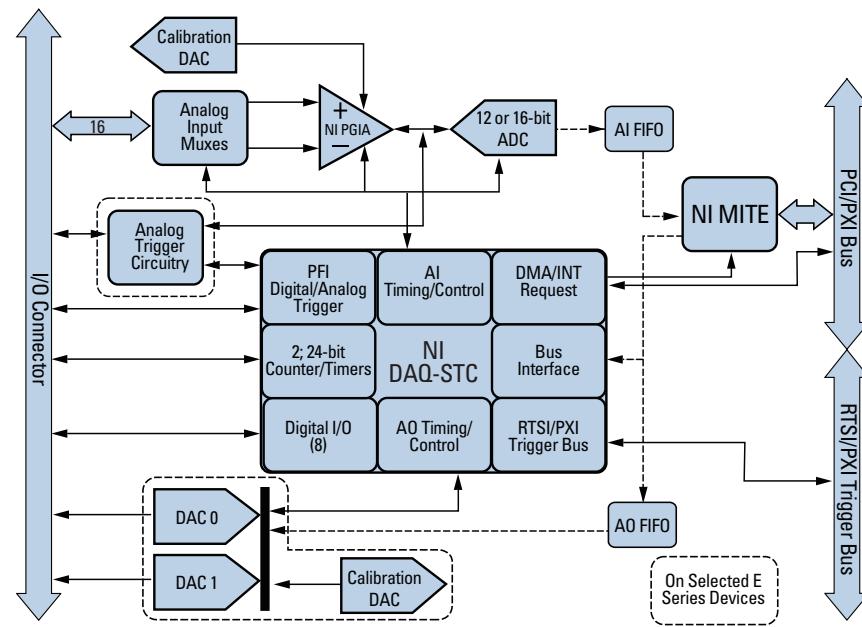


Diagram 2. E Series Diagram

Driver Software for Data Acquisition and Signal Conditioning

NI-DAQ

- Driver software for NI data acquisition and signal conditioning hardware
- Short time to first measurement with quick configuration and application-specific example programs
- Named and scaled channels remove configuration complexity
- Multiple-device synchronization and integration with RTI or PXI trigger bus
- Networking features for remote and distributed measurements
- Robust double-buffered DMA data management routines

Operating Systems

- Windows 2000/NT/XP/Me/9x
- Mac OS 9
- Others such as Linux (see page 187)
- Real-Time performance with LabVIEW (page 134)

Recommended Software

- LabVIEW
- LabWindows/CVI
- Measurement Studio for Visual Basic
- VI Logger

Other Compatible Software

- Visual Basic
- C/C++



Overview

The quality of your configuration and driver software is just as important as the quality of your measurement hardware. NI-DAQ is a robust, time-proven driver for NI data acquisition and signal conditioning hardware. This software helps you quickly install your device and begin taking measurement data. NI-DAQ includes hundreds of application examples to jump-start your application development. NI-DAQ delivers the same ease of use and performance across many development environments, operating systems, and computer buses.

Integrated Software Framework

Software ties the various pieces of measurement hardware together into a complete measurement system. National Instruments provides an integrated software framework (see Figure 1) to increase development productivity and decrease cost. NI-DAQ is part of the measurement and control services software, which tightly integrates NI measurement hardware with your application development environment. Because NI-DAQ is built in this framework, you can easily integrate and synchronize multiple measurement types, including motion and vision, with your data acquisition system. With this flexible, hardware-independent software, you can achieve interactive configuration, powerful programming, and excellent measurement performance.

Configuration with Measurement & Automation Explorer

Measurement & Automation Explorer simplifies the configuration of your measurement hardware, so you can:

- Quickly detect and configure all hardware

- Use test panels to verify the operation of your hardware (See Figure 4)
- Make simple, interactive measurements
- Name and scale your I/O channels to physical or engineering units (See Figure 3)

Powerful Programming

NI-DAQ software isolates you from hardware-specific register commands and gives you a simple, yet powerful application programming interface (API) between the complete hardware capabilities and a wide variety of development environments and languages. Because of the consistent API, you can use different DAQ hardware with the same application without modifying your software.

High-Performance Measurements

NI-DAQ is optimized for measurement performance and ease of use. NI-DAQ software delivers:

- Efficiency and speed through event-driven programming
- Synchronization of measurements across multiple devices
- Seamless integration of measurement accessories
- Flawless buffer and DMA management

Driver Software for Data Acquisition and Signal Conditioning

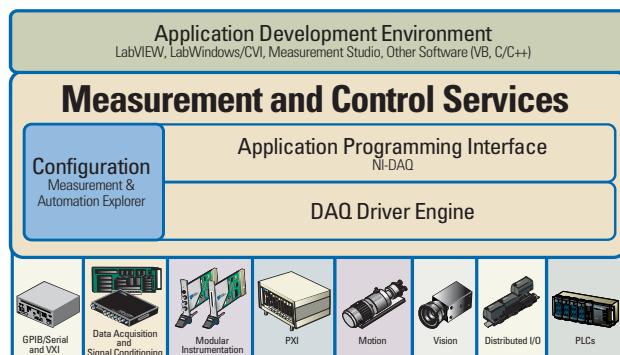


Figure 1. Integrated Software Framework

LabVIEW and NI-DAQ

Using NI-DAQ, you can easily acquire, analyze, and present your measurements in LabVIEW. Figure 4 shows the block diagram of a typical data acquisition in LabVIEW. With the first set of NI-DAQ VIs, you configure your acquisition and read data from your sensor. Because this VI uses a named channel, most of the signal conditioning and DAQ hardware configuration is handled automatically. Next, you route the waveform from the read VI to the peak detect measurement VI. The waveform data type carries the scaled sensor and time data to the measurement function. Finally, the measurement data can be displayed in an indicator and/or a waveform graph that automatically has the correct time and engineering units.

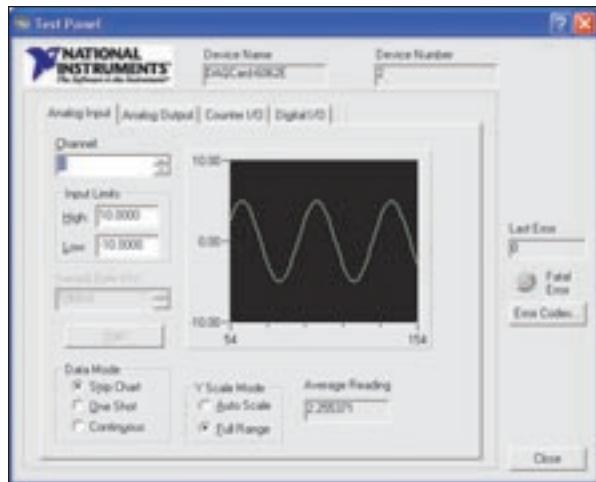


Figure 2. Quickly test your devices with the NI-DAQ test panels.

Measurement Examples

The NI Developer Zone (ni.com/zone) has more than 2,400 LabVIEW, C, and Visual Basic source code examples written by NI development and application engineers, system integrators, and customers. These free measurement examples cover basic

functional examples such as analog and digital I/O, counter/timer operations, and signal processing and analysis. Plus, you can search on applications ranging from temperature and strain to sound and vibration to machine vision and motion control. With NI's increasing community of virtual instrumentation developers, the number of examples continues to grow quickly.



Figure 3. Measurement & Automation Explorer makes naming, scaling, and accessing I/O channels easy.

Other Operating Systems

NI-DAQ is built on proven, industry-standard Windows and Mac OS technologies. If your application requires the use of another operating system, you have several options. For information on an open-source, third-party Linux driver, please visit ni.com/linux. For other OSs, such as WinCE and QNX, please see the Measurement Hardware DDK on the following page.

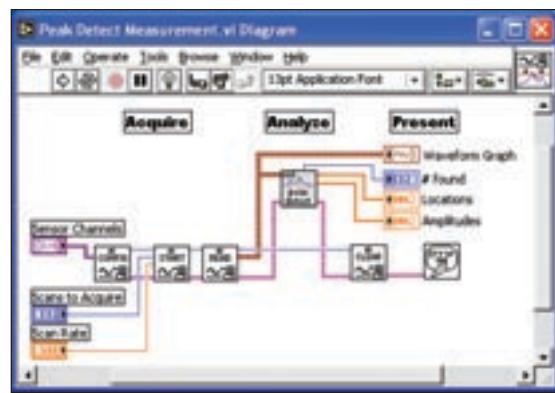


Figure 4. Acquire, analyze, and present with NI-DAQ and LabVIEW.

Multifunction DAQ Cable and Accessory Selection Guides

NI Cable Design Advantages

The SH68-68-EP cable is the most commonly used E Series and S Series cable. The cable is designed to work specifically with the NI Multifunction DAQ devices to preserve signal integrity through these technologies:

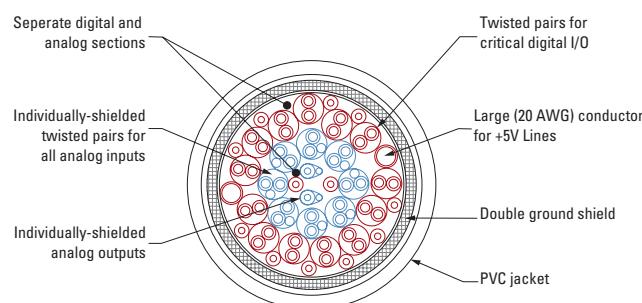


Figure 1. SH68-68-EP Cable

A variety of cabling and accessory options are available for your needs. Use the following tables to choose the most appropriate cables and accessories. To determine which Multifunction DAQ device best fits your needs, please see page 192.

ACH0-	34	68	ACH0+	ACH8	34	68	ACH0
ACH1+	33	67	ACH0GND	ACH1	33	67	AIGND
ACH1GND	32	66	ACH1-	ACH9	32	66	ACH9
ACH2-*	31	65	ACH2+*	ACH10	31	65	ACH2
ACH3-*	30	64	ACH2GND*	ACH3	30	64	AIGND
ACH3GND*	29	63	ACH3-*	ACH11	29	63	ACH11
NC	28	62	NC	ACH12	28	62	AISENSE
NC	27	61	NC	ACH13	27	61	ACH12
NC	26	60	NC	ACH14	26	60	ACH5
NC	25	59	NC	ACH15	25	59	AIGND
NC	24	58	NC	DI04	24	58	ACH14
NC	23	57	NC	DI05	23	57	ACH7
DAC0OUT	22	56	NC	DAC0OUT ¹	22	56	AIGND
DAC1OUT	21	55	AOGND	DAC1OUT ¹	21	55	AOGND ¹
NC	20	54	AOGND	EXTREF ¹	20	54	AOGND ¹
DI04	19	53	DGND	DI04	19	53	DGND
DGND	18	52	DI00	DI05	18	52	DI00
DI01	17	51	DI00	DI06	17	51	DI05
DI01	17	51	DI05	DGND	16	50	DGND
DI06	16	50	DGND	DGND	15	49	DI02
DGND	15	49	DI02	+5 V	14	48	DI07
DGND	14	48	DI07	DGND	13	47	DI03
DGND	13	47	DI03	DGND	12	46	SCANCLK
DGND	12	46	SCANCLK**	PF10/TRIG1	11	45	EXTSTROBE*
PF10/TRIG1	11	45	EXTSTROBE**	PF11/TRIG2	10	44	DGND
PF11/TRIG2	10	44	DGND	DGND	9	43	PF12/CONVERT*
DGND	9	43	PF12/CONVERT*	PF13/GPCTR1_SOURCE	8	42	PF13/GPCTR1_SOURCE
5 V Output	8	42	PF13/GPCTR1_SOURCE	PF14/GPCTR1_GATE	7	41	PF14/GPCTR1_GATE
DGND	7	41	PF14/GPCTR1_GATE	PF15/UPDATE*	6	40	GPCTR1_OUT
PF15/UPDATE*	6	40	GPCTR1_OUT	PF16/WTRIG	5	39	DGND
PF16/WTRIG	5	39	DGND	DGND	4	38	PF17/STARTSCAN
DGND	4	38	PF17/STARTSCAN	PF19/GPCTR0_GATE	3	37	PF18/GPCTR0_SOURCE
PF19/GPCTR0_GATE	3	37	PF18/GPCTR0_SOURCE	GPCTR0_DUT	2	36	DGND
GPCTR0_DUT	2	36	DGND	FREQ_OUT	1	35	DGND
FREQ_OUT	1	35	DGND				

¹Not used on NI PCI-6032E, NI PCI-6023, NI PCI-6034E, NI PCI-6013

Figure 3. I/O Connector for 16-channel E Series Devices, except NI 6025E

Figure 2. S Series Devices Connector

Platform	Shielding	Connect to ...	Cable	Adapter	Accessory
PCI/PXI/USB/FireWire	Shielded	SCC portable signal conditioning per channel	SH68-68-EP	—	SC-2345 and modules, p. 320
		SCXI high-performance signal conditioning	SCXI-1349	—	SCXI Chassis and Modules, p. 246
		Screw terminals ¹	SH68-68-EP or SH68-68R1-EP	—	SCB-68
		BNC terminal block	SH68-68-EP	—	BNC-2110, BNC-2120, BNC-2090
		50-pin connector	SH6850	—	CB50, custom or 3rd party
	Unshielded	Configurable connectivity box	SH68-68-EP	—	CA-1000
		Screw terminals ¹	R6868	—	TBX-68, CB-68LP, CB-68LPR, DAQ Signal Accessory
PXI only	Shielded	Front-mounted screw terminals	N/A	—	TB-2705
PCMCIA	Shielded	Screw terminals ¹	SHC68-68-EP or SHC68U-68-EP ²	—	SCB-68, CA-1000
		50-pin connector	SHC68-68-EP or SHC68U-68-EP ²	68M-50F MIO	CB50, custom or 3rd party
	Unshielded	Screw terminals ¹	RC68-68	—	TBX-68, CB-68LP, CB-68LPR, DAQ Signal Accessory
		50-pin connector	RC68-68	68M-50F MIO	CB50, custom or 3rd party

ISA - Visit ni.com/info and enter in "legacy" for more information on ISA products

¹Unshielded Cables can connect to Shielded Accessories and vice-versa.

²In adjacent PCMCIA slots, both cables types are required because the same cable would cause mechanical hindrance.

Table 1. Cable Connection Specifications for 16-Channel E Series Devices (except NI 6025E)

Multifunction DAQ Cable and Accessory Selection Guides

AIGND	1	51	—	ACH16	1	51	—	PC7
AIGND	2	52	—	ACH24	2	52	GND	
ACH0	3	53	—	ACH17	3	53	—	PC6
ACH8	4	54	—	ACH25	4	54	GND	
ACH1	5	55	—	ACH18	5	55	—	PC5
ACH9	6	56	—	ACH26	6	56	GND	
ACH2	7	57	—	ACH19	7	57	—	PC4
ACH10	8	58	—	ACH27	8	58	—	GND
ACH3	9	59	—	ACH20	9	59	—	PC3
ACH11	10	60	—	ACH28	10	60	—	GND
ACH4	11	61	—	ACH21	11	61	—	PC2
ACH12	12	62	—	ACH29	12	62	GND	
ACH5	13	63	—	ACH22	13	63	—	PC1
ACH13	14	64	—	ACH30	14	64	GND	
ACH6	15	65	—	ACH23	15	65	—	PC0
ACH14	16	66	—	ACH31	16	66	GND	
ACH7	17	67	—	ACH32	17	67	—	PB7
ACH15	18	68	—	ACH40	18	68	GND	
AISENSE	19	69	—	ACH33	19	69	—	PB6
DAC1OUT ¹	20	70	—	ACH41	20	70	GND	
DAC2OUT ¹	21	71	—	ACH34	21	71	—	PB5
EXTREF ¹	22	72	—	ACH42	22	72	GND	
AOGND ¹	23	73	—	ACH35	23	73	—	PB4
DGND	24	74	—	ACH43	24	74	GND	
DI00	25	75	—	AISENSE2	25	75	—	PB3
DI04	26	76	—	AIGND	26	76	GND	
DI01	27	77	—	ACH36	27	77	—	PB2
DI05	28	78	—	ACH44	28	78	GND	
DI02	29	79	—	ACH37	29	79	—	PB1
DI06	30	80	—	ACH45	30	80	GND	
DI03	31	81	—	ACH38	31	81	—	PB0
DI07	32	82	—	ACH46	32	82	GND	
DGND	33	83	—	ACH39	33	83	—	PA7
+5V	34	84	—	ACH47	34	84	GND	
+5V	35	85	—	ACH48	35	85	—	PA6
SCANCLK	36	86	—	ACH56	36	86	GND	
EXTSTROBE ¹	37	87	—	ACH49	37	87	—	PA5
PF10/TRIG1	38	88	—	ACH57	38	88	GND	
PF11/TRIG2	39	89	—	ACH50	39	89	—	PA4
PF12/CONVERT ¹	40	90	—	ACH58	40	90	GND	
PF13/GPCTR1_SOURCE	41	91	—	ACH51	41	91	—	PA3
PF14/GPCTR1_GATE	42	92	—	ACH59	42	92	GND	
GPCTR1_OUT	43	93	—	ACH52	43	93	—	PA2
PF15/UPDATE ¹	44	94	—	ACH60	44	94	GND	
PF16/WFTRIG	45	95	—	ACH53	45	95	—	PA1
PF17/STARTSCAN	46	96	—	ACH61	46	96	GND	
PF18/GPCTR0_SOURCE	47	97	—	ACH54	47	97	—	PA0
PF19/GPCTR0_GATE	48	98	—	ACH62	48	98	GND	
GPCTR0_OUT	49	99	—	ACH55	49	99	—	+5V
FREQ_OUT	50	100	—	ACH63	50	100	—	

¹Not available on NI PCI-6033E

Figure 4. I/O Connector for 64-channel NI devices

AIGND	1	51	—	PC7				
AIGND	2	52	—	GND				
ACH0	3	53	—	PC6				
ACH8	4	54	—	GND				
ACH1	5	55	—	PC5				
ACH9	6	56	—	GND				
ACH2	7	57	—	PC4				
ACH10	8	58	—	GND				
ACH3	9	59	—	PC3				
ACH11	10	60	—	GND				
ACH4	11	61	—	PC2				
ACH12	12	62	—	GND				
ACH5	13	63	—	PC1				
ACH13	14	64	—	GND				
ACH6	15	65	—	PC0				
ACH14	16	66	—	GND				
ACH7	17	67	—	PB7				
ACH15	18	68	—	GND				
AISENSE	19	69	—	PB6				
DAC1OUT	20	70	—	GND				
DAC2OUT	21	71	—	PB5				
RESERVED	22	72	—	GND				
AOGND	23	73	—	PB4				
DGND	24	74	—	GND				
DI00	25	75	—	PB3				
DI04	26	76	—	GND				
DI01	27	77	—	PB2				
DI05	28	78	—	GND				
DI02	29	79	—	PB1				
DI06	30	80	—	GND				
DI03	31	81	—	PB0				
DI07	32	82	—	GND				
DGND	33	83	—	PA7				
+5V	34	84	—	GND				
+5V	35	85	—	PA6				
SCANCLK	36	86	—	GND				
EXTSTROBE ¹	37	87	—	PA5				
PF10/TRIG1	38	88	—	GND				
PF11/TRIG2	39	89	—	PA4				
PF12/CONVERT ¹	40	90	—	GND				
PF13/GPCTR1_SOURCE	41	91	—	PA3				
PF14/GPCTR1_GATE	42	92	—	GND				
GPCTR1_OUT	43	93	—	PA2				
PF15/UPDATE ¹	44	94	—	GND				
PF16/WFTRIG	45	95	—	PA1				
PF17/STARTSCAN	46	96	—	GND				
PF18/GPCTR0_SOURCE	47	97	—	PA0				
PF19/GPCTR0_GATE	48	98	—	GND				
GPCTR0_OUT	49	99	—	+5V				
FREQ_OUT	50	100	—					

Figure 5. I/O Connector for the NI 6025E device

E Series Devices (NI 6031E, NI 6033E, NI 6071E, NI 6025E)

Platform	Shielding	Connect to ...	Cable	Cable Leg	Adapter	Accessory
PCI, PXI	Shielded	Screw Terminals	SH100100	—	—	SCB-100
		Screw Terminals	SH1006868	MIO:	—	SCB-68
				Extended:	—	SCB-68
		Screw Terminals ¹	SH1006868	MIO:	—	TBX-68, CB-68LP, CB-68LPR, DAQ Signal Accessory
				Extended:	—	TBX-68, CB-68LP, CB-68LPR
		BNC Terminal Block	SH1006868	MIO:	—	BNC-2110, BNC-2120, BNC-2090
				Extended:	—	BNC-2115
PCI	Unshielded	50-pin Connectors	SH1006868	MIO:	68M-50F MIO	custom or 3rd party
				Extended:	68M-50F Extended	custom or 3rd party
		50-pin Connector	R1005050	MIO:	—	custom or 3rd party
				Extended:	—	custom or 3rd party

ISA - Visit ni.com/info and enter in "legacy" for more information on ISA Products.

¹Shielded cable with unshielded accessories

Table 1. Cable Connection Specifications for 64-Channel E Series Devices and the NI 6025E

Multifunction DAQ Accessories

SCXI High-Performance Modular Signal Conditioning (see Figure 1)

SCXI is a high-performance modular signal conditioning platform that you use as a front end to your E Series DAQ device. With the SCXI multiplexing architecture, you can expand your analog inputs to 3,072 channels. Additionally, SCXI offers a variety of modules for connecting to thermocouples, RTDs, strain gauge transducers, LVDT position sensors, ICP-compatible accelerometers/microphones, thermistors, millivolt inputs, voltage inputs up to 1000 V, current inputs (0-20mA), frequency inputs or dynamic signals.

See page 246 for details on SCXI Signal Conditioning.

SCC Portable Modular Signal Conditioning for Low-Channel-Count Applications (see Figure 2)

The SCC Series portable modular signal conditioning system consists of SCC modules that plug into a low-profile SC-2345 shielded carrier. SCC modules give you single or dual-channel signal conditioning for up to 16 analog input channels and eight digital I/O lines of your E Series or basic multifunction DAQ device. The SCC Series offers signal conditioning for a variety of inputs, including thermocouples, RTDs, strain gauges, ICP-compatible accelerometers, accelerometers, analog inputs requiring isolation, high voltage (up to 100 V), current (0-20mA), and optically isolated digital I/O. Lowpass filtering and breadboard modules are also available.

See page 320 for details on SCC Signal Conditioning.

Connector Blocks

BNC-2100 Series Connector Blocks (see Figure 3)

The BNC-2100 Series are shielded connector blocks with signal-labeled BNC connectors for easy connectivity of your analog input, analog output, digital I/O and counter/timer signals to your multifunction DAQ device, including analog input devices. The BNC-2110 and BNC-2120 work with all E Series devices. The BNC-2120 also provides a function generator, quadrature encoder, temperature reference, thermocouple connector, and LED so that you can test the functionality of your hardware. The BNC-2115 has 24 BNC inputs for connecting to the extended I/O channels of our 100-pin E Series DAQ devices.

BNC-2110.....777643-01

Dimensions – 20.3 by 11.2 by 5.5 cm (8.0 by 4.4 by 2.2 in.)

BNC-2115.....777807-01

Dimensions – 20.3 by 11.2 by 5.5 cm (8.0 by 4.4 by 2.2 in.)

BNC-2120.....777960-01

Dimensions – 26.7 by 11.2 by 6.0 cm (10.5 by 4.4 by 2.4 in.)



Figure 1. SCXI High-Performance Signal Conditioning



Figure 2. SCC Portable, Modular Signal Conditioning



Figure 3. BNC-2100 Series Connector Blocks – BNC-2120, BNC-2110, BNC-2115



Figure 4. SC-2075 Breadboard Connector Block

SC-2075 Breadboard Connector Block (see Figure 4)

The SC-2075 provides breadboard area for prototyping and BNC and spring terminal connectivity for 68-pin E Series DAQ devices. The built-in ± 15 V or adjustable 0 to 5 V power supply and LEDs for digital lines make the SC-2075 a cost-effective device, ideal for academic laboratories.

SC-2075.....778147-90

Dimensions – 26.72 by 20.70 by 4.37 cm (10.52 by 8.15 by 1.72 in.)

Multifunction DAQ Accessories



Figure 5. BNC-2090 Shielded BNC Adapter Chassis



Figure 6. CA-1000 Configurable Signal Conditioning Enclosure



Figure 7. TB-2705 Terminal Block



Figure 8. SCB-68 and SCB-100 Shielded I/O Connector Blocks

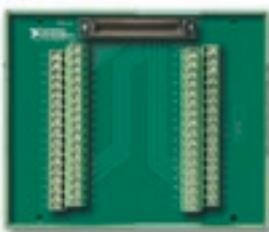


Figure 9. TBX-68 I/O Connector Block

BNC-2090 Shielded BNC Adapter Chassis (see Figure 5)

The BNC-2090 is a shielded, rack-mountable adapter with signal-labeled BNC connectors, spring terminal blocks, and component locations for passive signal conditioning. Consists of 22 BNC connectors and 28 spring terminals to simplify connection to your analog, digital, trigger and counter/timer signals. The BNC-2090 has silk-screened component locations that you use to develop simple signal conditioning circuits. For added flexibility, you can connect any E Series DAQ device to the BNC-2090 from the front or rear through dual 68-pin connectors.

Part Number: BNC-2090 777270-01
 Dimensions – 48.3 by 4.4 by 18.8 cm (19.0 by 1.7 by 7.4 in.)

CA-1000 Configurable Signal Conditioning Enclosure (see Figure 6)

The CA-1000 is a configurable enclosure that gives you maximum user-defined connectivity and flexibility through customized panelettes. Each enclosure can accommodate up to nine panelettes.

Dimensions – 30.7 by 25.4 by 4.3 cm (21.1 by 10 by 1.7 in.)

See page 352 for more information about the CA-1000.

TB-2705 Terminal Block for 68-pin PXI E Series Devices (see Figure 7)

The TB-2705 is a screw terminal block for PXI that works with your PXI E Series DAQ module. It latches to the front of your PXI module with locking screws and provides strain relief and easy access to your analog, digital, trigger and counter/timer signals through screw terminals.

Part Number: TB-2705 778241-01
 Dimensions – 8.43 by 10.41 by 2.03 cm (3.32 by 4.1 by 0.8 in.)

SCB-68 and SCB-100 Shielded I/O Connector Blocks (see Figure 8)

The SCB-68 and SCB-100 are shielded I/O connector blocks for rugged, very low-noise signal termination for connecting to 68-pin or 100-pin E Series DAQ devices, respectively. Silk-screened component locations for easy addition of simple signal-conditioning circuitry for your analog input channels. They also include general-purpose breadboard areas (two on the SCB-68; three on the SCB-100) as well as an IC temperature sensor for cold-junction compensation in temperature measurements.

Part Number: SCB-68 776844-01
 Dimensions – 19.5 by 15.2 by 4.5 cm (7.7 by 6.0 by 1.8 in.)
 Part Number: SCB-100 776990-01
 Dimensions – 19.5 by 15.2 by 4.5 cm (7.7 by 6.0 by 1.8 in.)

TBX-68 I/O Connector Block with DIN-Rail Mounting (see Figure 9)

The TBX-68 is a termination accessory with 68 screw terminals for easy connection of field I/O signals to 68-pin DAQ devices. It includes one 68-pin male connector for direct connection to 68-pin cables. The TBX-68 is mounted in a protective plastic base with hardware for mounting on a standard DIN rail.

Part Number: TBX-68 777141-01
 Dimensions – 12.50 by 10.74 cm (4.92 by 4.23 in.)

Multifunction DAQ Accessories

CB-68LP and CB-68LPR I/O Connector Blocks (see Figure 10)

The CB-68LP and CB-68LPR are low-cost termination accessories with 68 screw terminals for easy connection of field I/O signals to 68-pin E Series DAQ devices. They include one 68-pin male connector for direct connection to 68-pin cables. The connector blocks include standoffs for use on a desktop or for mounting in a custom panel. The CB-68LP has a vertical-mounted 68-pin connector. The CB-68LPR has a right-angle mounted connector, and it is used with the CA-1000 (see page 352).

CB-68LP 777145-01

Dimensions – 14.35 by 10.74 cm (5.65 by 4.23 in.)

CB-68LPR 777145-02

Dimensions – 7.62 by 16.19 cm (3.00 by 6.36 in.)

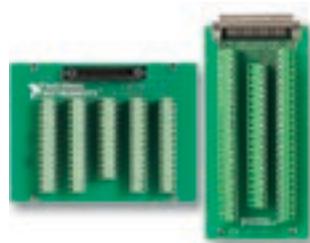


Figure 10. CB-68LP and CB-68LPR I/O Connector Blocks

DAQ Signal Accessory (see Figure 11)

The DAQ Signal Accessory demonstrates and tests the use of analog, digital, and counter/timer functions of DAQ devices. You can connect the DAQ Signal Accessory directly to your DAQ device. It features a built-in function generator, quadrature encoder, solid-state relay, IC temperature sensor, noise generator, microphone jack, thermocouple jack, four LEDs, and a digital trigger button. The DAQ Signal Accessory works with all E Series DAQ devices.

DAQ Signal Accessory 777382-01

Dimensions – 12.7 by 12.7 cm (5.0 by 5.0 in.)



Figure 11. DAQ Signal Accessory

RTSI Bus Cables (see Figure 12)

Use RTSI bus cables to connect timing and synchronization signals among Measurement, Vision, Motion, and CAN boards for PCI, and FireWire DAQPad devices. For systems using long and short boards, order the extended RTSI cable.

2 boards 776249-02

3 boards 776249-03

4 boards 776249-04

5 boards 776249-05

Extended, 5 boards 777562-05

3 FireWire DAQPads 186464-01

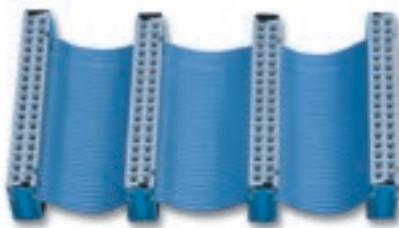


Figure 12. RTSI Bus Cable

Shielded I/O Cables

SH68-68-EP Shielded Cable (see Figure 13)

The SH68-68-EP is a shielded 68-conductor cable terminated with two 68-pin female 0.050 series D-type connectors. It features individually-shielded analog twisted pairs for reduced crosstalk with high-speed devices. This cable connects to all 68-pin E Series devices (except DAQCards). If you need a right-angle connector, the SH68-68R1-EP shielded cable is electrically equivalent.

1 m 184749-01

2 m 184749-02

Please call for other length options.



Figure 13. SH68-68-EP Shielded Cable

SH68-68R1-EP Shielded Cable (see Figure 14)

The SH68-68R1-EP is a shielded 68-conductor cable. One end terminates with a 68-pin female 0.050 series D-type connector and the other end terminates with a right-angle 68-pin female 0.050 series D-type connector.

1 m 187051-01



Figure 14. SH68-68R1-EP Shielded Cable

Multifunction DAQ Accessories



Figure 15. SH100100 Shielded Cable



Figure 16. 68M-50F Cable Adapters



Figure 17. SH1006868 Shielded Cable



Figure 18. SHC68-68-EP and SHC68U-68-EP Shielded Cables



Figure 19. SH6850 Shielded Cable

SH100100 Shielded Cable (see Figure 15)

The SH100100 is a shielded 100-conductor cable terminated with 100-pin male 0.050 series D-type connectors. This cable connects the 100-pin E Series devices to 100-pin accessories.

1 m.....	182853-01
2 m.....	182853-02

68M-50F S Series Cable Adapters (see Figure 16)

The 68M-50F cable adapter connects a 68-pin NI cable to a standard 0.1 by 0.1 in. 50-pin connector on third-party or custom accessories. The 68M-50F MIO should be used with the SH68-68-EP, SHC68-68-EP, SHC68U-68-EP, or the MIO leg of the SH1006868. The 68M-50F Extended I/O cable adapter should be used for the extended I/O leg of the SH1006868.

68M-50F MIO	184670-01
68M-50F Extended I/O	184670-02

SH1006868 Shielded Cable (see Figure 17)

The SH1006868 is a shielded cable that connects to 100-pin E Series devices and terminates with two female 68-pin 0.050 series D-type connectors. See Table 2 on page 256 for accessories compatible with each 68-pin connector.

1 m.....	182849-01
2 m.....	182849-02

SHC68-68-EP and SHC68U-68-EP Shielded Cables for DAQCards (see Figure 18)

These cables connect DAQCards to standard 68-pin accessories. Latching screws secure the shielded connector to the PCMCIA DAQCard. The SHC68-68-EP is a shielded 68-conductor cable terminated with a VHDCI 68-pin male connector at one end and a 68-pin female 0.050 series D-type connector at the other. The SHC68U-68-EP is identical to the SHC68-68-EP except it uses an inverted VHDCI 68-pin male connector. Use the SHC68-68-EP cable with a DAQCard inserted in the lower PCMCIA slot in your laptop or when using only one DAQCard. Use the SHC68U-68-EP for a DAQCard located in the upper PCMCIA slot in your laptop. When using two E Series DAQCard PCMCIA devices in adjacent slots, use one SHC68-68-EP and one SHC68U-68-EP.

SHC68-68-EP	
0.5 m	186838-0R5
1 m	186838-01
SHC68U-68-EP	
0.5 m	187406-0R5
1 m	187406-01

SH6850 Shielded Cable (see Figure 19)

The SH6850 connects a standard 68-pin E Series or S Series product to a 3rd party or custom standard 50-pin accessory. The cable provides a screw-latching 68-pin female connector on one side and a standard 50-pin female connector on the other side.

1 m	776784-01
2 m	776784-02

Multifunction DAQ Accessories

Ribbon I/O Cables

R6868 Ribbon Cable for E Series Devices (see Figure 20)

The R6868 is a 68-conductor flat ribbon cable terminated with two 68-pin connectors. Use this cable to connect a 68-pin E Series device to 68-pin accessories.

1 m 182482-01



Figure 20. R6868 Ribbon Cable

RC68-68 Ribbon Cable for DAQCards (see Figure 21)

The RC68-68 ribbon cable connects DAQCards directly to 68-pin accessories. Two RC68-68 cables can be used together in adjacent PCMCIA slots.

0.25 m 187252-0R25

1 m 187252-01



Figure 21. RC68-68 Ribbon Cable

R1005050 Ribbon Cable (see Figure 22)

This cable connects 100-pin E Series devices, including the NI 6071E, NI 6033E, NI 6031E, and NI 6025E to standard 50-pin 3rd party or custom connectors.

1 m 182762-01

2 m 182762-02



Figure 22. R1005050 Ribbon Cable

R6850 Ribbon Cable Kit (see Figure 23)

This cable kit combines a 68F-50M cable adapter and a standard 50-pin cable with female connectors on both ends. The cable kit is designed to adapt an E Series, S Series, or PCI-6013/6014 product to a third-party or custom 50-pin accessory.

1 m 776842-01



Figure 23. R6850 Ribbon Cable Kit

Custom Connectivity Components

68-Pin Custom Cable Connector/Backshell Kit (see Figure 24)

The 68-pin female mating connector and backshell kit is used to make custom cables. Solder-cup contacts are available for soldering cable wires to the connector.

68-pin connector/backshell kit 776832-01

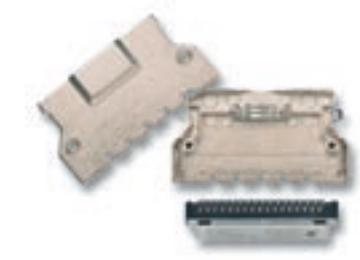


Figure 24. 68-Pin Custom Cable Connector/Backshell Kit



Figure 25. PCB Mounting Connectors for Custom Accessories



Figure 26. PCMCIA Strain-Relief Accessory



Figure 28. Use the interactive configuration tool in the NI online catalog to select and purchase multifunction DAQ solutions.

Multifunction DAQ Accessories

PCB Mounting Connectors for Custom Accessories (see Figure 25)

PCB mounting connectors are used to build custom accessories that connect to 68-conductor or 100-conductor shielded and ribbon cables. Two connectors are available, one for right-angle and one for vertical mounting onto a PCB.

68-pin, male, right-angle mounting	777600-01
68-pin, male, vertical mounting	777601-01
100-pin, female, right-angle mounting	777778-01
100-pin, female, vertical mounting	777779-01

PCMCIA Strain-Relief Accessory (see Figure 26)

The PCMCIA Strain-Relief accessory attaches to the bottom of your notebook computer and provides adjustable strain relief for one or two PCMCIA cables attached to the installed PCMCIA card(s).

PCMCIA Strain-Relief Accessory	777550-01
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Use Interactive Online Catalog Configurator for Quick Product Selection

You can now easily configure NI multifunction data acquisition (DAQ) measurement systems using a new, interactive feature of our online catalog. The interactive online catalog offers a better, easier way to select and purchase measurement solutions from National Instruments. Based on user input, the interactive online catalog suggests products and then lists the appropriate cables and accessories for those products. This new automated tool helps eliminate ordering mistakes and product-compatibility errors.

To take advantage of the online catalog for multifunction DAQ devices, visit ni.com/catalog

From the Products and Services menu, select Data Acquisition, then select Multifunction I/O. The online catalog prompts you with a series of questions regarding preferences for operating system, computer bus, number of channels, and maximum sampling rate. The online catalog then recommends several appropriate DAQ devices. You can then review specifications for each device and select your preferred product. Next, the catalog suggests the preferred accessory and cable solution designed to work with the selected DAQ device. You have the option of choosing the preferred configuration or choosing from a separate list of accessories and cables that also work with the selected DAQ device. You can purchase the selected items online.

16-Bit E Series Multifunction DAQ Specifications

Specifications – NI 6052E and NI 603xE

These specifications are typical for 25 °C unless otherwise noted.

Analog Input

Accuracy specifications See tables in E Series product pages.

Input Characteristics

Number of channels

6052E 6030E 6032E 6034E 6036E	16 single-ended or 8 differential (software selectable per channel)
6031E 6033E	64 single-ended or 32 differential (software-selectable per channel)

Resolution 16 bits, 1 in 65,536

Maximum sampling rate

6052E	333 kS/s
6034E	200 kS/s
6036E	
6030E	100 kS/s
6031E	
6032E	
6033E	

Streaming-to-disk rate (system dependent)¹

6052E	333 kS/s
6034E	200 kS/s
6036E	
6030E	100 kS/s
6031E	
6032E	
6033E	

¹Streaming-to-disk rates do not apply to RT Series devices.

Input signal ranges

Device	Range Software Selectable	Bipolar Input Range	Unipolar Input Range
6052E	20 V	±10 V	–
	10 V	±5 V	0 to 10 V
	5 V	±2.5 V	0 to 5 V
	2 V	±1 V	0 to 2 V
	1 V	±500 mV	0 to 1 V
	500 mV	±250 mV	0 to 500 mV
	200 mV	±100 mV	0 to 200 mV
	100 mV	±50 mV	0 to 100 mV
6030E	20 V	±10 V	–
	10 V	±5 V	0 to 10 V
	5 V	–	0 to 5 V
	4 V	±2 V	–
	2 V	±1 V	0 to 2 V
	1 V	±500 mV	0 to 1 V
	500 mV	–	0 to 500 mV
	400 mV	±200 mV	–
	200 mV	±100 mV	0 to 200 mV
	100 mV	–	0 to 100 mV
6034E 6036E	20 V	±10 V	–
	10 V	±5 V	–
	1 V	±500 mV	–
	100 mV	±50 mV	–

Input coupling DC

Maximum working voltage

(signal + common mode) Each input should remain within
±11 V of ground

Overvoltage protection

Powered on ±25 V

Powered off ±15 V

Inputs protected

6052E 6030E 6032E 6034E 6036E	ACH<0..15>, AISENSE
6031E 6033E	ACH<0..63>, AISENSE, AISENSE2

FIFO buffer size 512 samples, (1024 samples for DAQCard)

Data transfers
PCI, PXI DMA, interrupts, programmed I/O
DAQCard Interrupts, programmed I/O

DMA modes
PCI, PXI Scatter-gather (single transfer,
demand transfer)

Configuration memory size 512 words

Transfer Characteristics

Relative accuracy (dithered)

Device	Typical	Maximum
6052E 6034E PCI-6036E	±1.5 LSB	±3 LSB
6030E 6031E 6032E 6033E	±0.75 LSB	±1 LSB
DAQCard-6036E	±3.0 LSB	±6 LSB

DNL

Device	Typical	Maximum
6052E	±0.5 LSB	±1 LSB
603xE (except DAQCard-6036E)	±4, -0.5 LSB	±4, -2 LSB

No missing codes 16 bits, guaranteed

Amplifier Characteristics

Input impedance

Device	Normal Powered On	Powered Off	Overload
6052E	100 GΩ in parallel with 100 pF	820 Ω	820 Ω
603xE			

Input bias and offset current

Device	Bias Current	Offset Current
6052E 6034E PCI-6036E	±200 pA	±100 pA
6030E 6031E 6032E 6033E	±1 nA	±2 nA
DAQCard-6036E	±200 pA	±100 pA

16-Bit E Series Multifunction DAQ Specifications

Specifications – NI 6052E and NI 603xE (continued)

CMRR, DC to 60 Hz

Device	Range	CMRR	
		Bipolar (dB)	Unipolar (dB)
6052E	20 V	92	—
	10 V	97	97
	5 V	101	101
	2 V	104	104
	100 mV to 1 V	105	105
6030E	20 V	92	—
	10 V	97	92
	5 V	—	97
	4 V	101	—
	2 V	104	101
	1 V	105	104
	100 mV to 500 mV	105	105
6034E	20 V	85	—
	10 V	85	—
	1 V	96	—
	100 mV	96	—

Dynamic Characteristics

Bandwidth

Device	Range	Small Signal (-3 dB)
6052E	All ranges	480 kHz
6030E	All ranges	255 kHz
6031E		
6032E		
6033E		
6034E	All ranges	413 kHz
6036E		

System noise (LSB_{ref}, including quantization)

Device	Range	Bipolar	Unipolar
6052E	2 to 20 V	0.95	0.95
	1 V	1.1	1.1
	500 mV	1.3	1.3
	200 mV	2.7	2.7
	100 mV	5.0	5.0
6030E	2 to 20 V	0.6	0.8
	1 V	0.7	0.8
	400 to 500 mV	1.1	1.1
	200 mV	2.0	2.0
	100 mV	—	3.8
6034E	10 to 20 V	0.8	—
	1 V	1.0	—
	100 mV	6.2	—
6036E	10 to 20 V	0.8	—
	1 V	1.0	—
	100 mV	6.2	—

Settling time to full-scale step

Device	Range	Accuracy				
		±0.00076% (±0.5 LSB)	±0.0015% (±1 LSB)	±0.0031% (±2 LSB)	±0.0061% (±4 LSB)	±0.024% (±6 LSB)
6052E	2 to 20 V	—	10 µs max	5 µs max	4 µs max	3 µs max
	1 V	—	15 µs max	5 µs max	4 µs max	3 µs max
	200 to 500 mV	—	15 µs max	10 µs max	4 µs max	3 µs max
	100 mV	—	15 µs typical	10 µs typical	4 µs max	3 µs max
6030E	All	40 µs max	20 µs max	—	10 µs max	—
6032E						
6031E	All	50 µs max	25 µs max	—	10 µs max	—
6033E						
6034E	1 to 10 V	—	—	5 µs max	—	—
6036E	200 mV	—	—	—	5 µs typical	—

Crosstalk

Device	Adjacent Channels	All Other Channels
6052E	-75 dB	-90 dB
603xE		

Analog Output

Output Characteristics

Number of channels

6052E	2 voltage outputs
6030E	
6031E	
6036E	
6032E	
6033E	None
6034E	

Resolution

6052E	16 bits, 1 in 65,536
6036E	
6030E	
6031E	

Maximum update rate

6052E	333 kS/s
6036E	10 kS/s, system dependent
6030E	100 kS/s
6031E	

Type of DAC Double buffered, multiplying

FIFO buffer size

6052E	2,048 samples
6030E	
6031E	
6036E	None

Data transfers

PCI, PXI DMA, interrupts, programmed I/O
DAQCard Interrupts, programmed I/O

DMA modes

PCI, PXI Scatter-gather (single transfer, demand transfer)

Transfer Characteristics

Relative accuracy

6052E	±0.35 LSB typical, ±1 LSB max
6030E	±0.5 LSB typical, ±1 LSB max
6031E	
6036E	±2 LSB max

DNL ±1.0 LSB max

Monotonicity

6052E	16 bits, guaranteed
6036E	
6030E	
6031E	

Voltage Output

Ranges

6052E	±10 V, 0 to 10 V, ±EXTREF, 0 to EXTREF; software selectable
6030E	±10 V, 0 to 10 V; software selectable
6031E	
6036E	±10 V

Output coupling DC

Output impedance 0.1 Ω max

Current drive ±5 mA max

Protection Short-circuit to ground

Power-on state

6052E	0 V (±20 mV)
6030E	
6031E	
PCI-6036E	0 V (±44 mV)
DAQCard-6036E	0 V (±60 mV)

16-Bit E Series Multifunction DAQ Specifications

Specifications – NI 6052E and NI 603xE (continued)

External reference input (6052E only)

Range	±11 V
Overvoltage protection	±25 V powered on, ±15 V powered off
Input impedance	10 kΩ
Bandwidth (-3 dB)	3 kHz
Slew rate	0.3 V/μs

Dynamic Characteristics

Settling time and slew rate

Device	Settling Time for Full-Scale Step	Slew Rate
6052E	3.5 μs to ±1 LSB accuracy	15 V/μs
6030E	10 μs to ±1 LSB accuracy	5 V/μs
6031E		
PCI-6036E	10 μs to ±4.0 LSB accuracy	15 V/μs
DAQCard-6036E	10 μs to ±0.5 LSB	5 V/μs

Noise

6052E	60 μV _{rms} , DC to 1 MHz
6030E	
6031E	
PCI-6036E	110 μV _{rms} , DC to 400 kHz
DAQCard-6036E	160 μV _{rms} , DC to 400 kHz

Glitch energy (at mid-scale transition)

Device	Magnitude	Duration
6052E	±10 mV	1 μs
6030E	N/A	N/A
6031E		
PCI-6036E	±10 mV	1 μs

Digital I/O

Number of channels	8 input/output
Compatibility	5 V/TTL/CMOS
Power-on state	Input (high impedance)
Data transfers	Programmed I/O
Digital logic levels	

Level	Minimum	Maximum
Input low voltage	0 V	0.8 V
Input high voltage	2 V	5 V
Output low voltage (Iout = 24 mA)	–	0.4 V
Output high voltage (Iout = 13 mA)	4.35 V	–

Timing I/O

General-Purpose Up/Down Counter/Timers

Number of channels	2
Resolution	24 bits (1 in 16, 777, 216)
Compatibility	5 V/TTL/CMOS

Digital logic levels

Level	Minimum	Maximum
Input low voltage	0.0 V	0.8 V
Input high voltage	2.0 V	5.0 V
Output low voltage (Iout = 5 mA)	–	0.4 V
Output high voltage (Iout = 3.5 mA)	4.35 V	–

Base clocks available	20 MHz and 100 kHz
Base clock accuracy	±0.01%
Maximum source frequency	20 MHz
External source selections	PFI <0..9>, RTSI <0..6>, analog trigger; software selectable
External gate selections	PFI <0..9>, RTSI <0..6>, analog trigger; software selectable
Minimum source pulse duration	10 ns
Minimum gate pulse duration	10 ns, edge-detect mode
Data transfers	
PCI, PXI	DMA, interrupts, programmed I/O
DAQCard	Interrupts, programmed I/O

DMA modes

PCI, PXI	Scatter-gather (single transfer, demand transfer)
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Frequency Scaler

Number of channels	1
Resolution	4 bits
Compatibility	5 V/TTL
Digital logic levels	

Level	Minimum	Max
Input low voltage	0.0 V	0.8 V
Input high voltage	2.0 V	5.0 V
Output low voltage (Iout = 5 mA)	–	0.4 V
Output high voltage (Iout = 3.5 mA)	4.35 V	–

Base clocks available	10 MHz, 100 kHz
Base clock accuracy	±0.01%
Data transfers	Programmed I/O

Triggers

Analog Triggers

Number of triggers

6052E	1
6030E	
6031E	
6032E	
6033E	
6034E	None
6036E	

Purpose

Analog input	Start and stop trigger, gate, clock
Analog output	Start trigger, gate, clock
General-purpose counter/timers	Source, gate

Source

6052E	ACH<0..15>, PF10/TRIG1
6030E	
6032E	
6031E	ACH<0..63>, PF10/TRIG1
6033E	

Level

Internal source, ACH<0..15/63>	±Full-scale
External source, PF10/TRIG1	±10 V
Slope	Positive or negative; software-selectable
Resolution	12 bits, 1 in 4,096
Hysteresis	Programmable
Bandwidth (-3 dB)	

Device	Internal Source ACH<0..15/63>	External Source PF10/TRIG1
6052E	700 kHz	700 kHz
6030E, 6031E, 6032E, 6033E	255 kHz	4 MHz

Accuracy

±1% of full-scale range max

Digital Triggers (all devices)

Number of triggers	2
Purpose	
Analog input	Start and stop trigger, gate, clock
Analog output	Start trigger, gate, clock
General-purpose counter/timers	Source, gate

Source

PFI <0..9>, RTSI <0..6>	
Slope	Positive or negative; software selectable
Compatibility	5 V/TTL
Response	Rising or falling edge
Pulse width	10 ns minimum

16-Bit E Series Multifunction DAQ Specifications

Specifications – NI 6052E and NI 603xE (continued)

External Input for Digital or Analog Trigger (PFI0/TRIG1)

Impedance	10 kΩ
Coupling	DC
Protection	
Digital trigger	-0.5 to (Vcc + 0.5) V
Analog trigger	
On/Off/Disabled	±35 V

Calibration

Recommended warm-up time..... 15 minutes; 30 minutes for DAQCard

Calibration Interval 1 year

Onboard calibration reference

DC Level

6052E	5.000 V (±1.0 mV)	Over full operating temperature, actual value stored in EEPROM
6030E		
6031E		
6032E		
6033E		
6034E	5.000 V (±3.5 mV)	
6036E		

Temperature coefficient

6052E	±0.6 ppm/°C max
6030E	
6031E	
6032E	
6033E	
6012E	±5.0 ppm/°C max
6034E	
6036E	

Long-term stability

6052E	±6.0 ppm/√1000 h
6030E	
6031E	
6032E	
6033E	
6034E	±15.0 ppm/√1000 h
6036E	

RTSI (PCI only)

Trigger lines..... 7

PXI Trigger Bus (PXI only)

Trigger lines..... 6

Star Trigger..... 1

Bus Interface

PCI, PXI..... Master, slave

DAQCard Slave

Power Requirements¹

Device	+5 VDC (±5%)	Power Available at I/O Connector
6052E	1.3 A	+4.65 to +5.25 VDC, 1 A
603xE (PCI, PXI); except 6034E	1.5 A	+4.65 to +5.25 VDC, 1 A
6034E		
PCI-6036E	0.9 A	+4.65 to +5.25 VDC, 1 A
DAQCard-6036E	300 mA	+4.65 to +5.25 VDC, 0.75 A

Physical¹

Dimensions (not including connectors)¹

PCI	17.5 by 10.6 cm (6.9 by 4.2 in.)
PXI	16.0 by 10.0 cm (6.3 by 3.9 in.)
DAQCard	Type II PC Card

I/O connectors

6052E	68-pin male SCSI-II type
6030E	
6032E	
6034E	
PCI-6036E	
6031E	100-pin female 0.050 D-type
6033E	
DAQCard-6036E	68-position VHDCI female

Environment

Operating temperature 0 to 55 °C; DAQCards should not exceed 55 °C while in PCMCIA slot

Storage temperature..... -20 to 70 °C

Relative humidity 10 to 90%, noncondensing

Certifications and Compliances

CE Mark Compliance

¹See page 146 for RT Series device power requirements and physical parameters.